

TE PUKE

Science Department

HIGH SCHOOL

Yr 11 NCEA Science

### **Carry out a practical science investigation with direction that leads to a linear mathematical relationship.**



Ball Pass Experiment

# **STUDENT INSTRUCTIONS SHEET**

**Introduction**

The purpose of this investigation is to determine the relationship between the number of people and the time taken to pass a tennis ball down the line. We will do the actual experiment as a class activity. You will be expected to complete the write-up of the experiment with your small groups

**Equipment:**

Tennis ball, stopwatch

**Method**

1. Time how long it takes one person to transfer a ball from the bench top to a rubbish bin.
2. Add one more person. The first person picks up the ball and passes it to the second. The second person drops the ball in the bin. Record the time to do this.
3. Add a third person. The first person picks up the ball, passes it to the second, who passes it on to the third person. The last person drops it into the bin. Record the time.
4. Continue adding a person at a time and recording the time to pass the ball down a chain, until the whole class is involved.

What is wrong with our method?

Let’s change it to increase accuracy and make it fairer.

# **Ball Pass Experiment:** **Planning Sheet Student name:­­\_\_\_\_\_\_\_­­­­­\_\_\_\_\_\_\_\_\_**

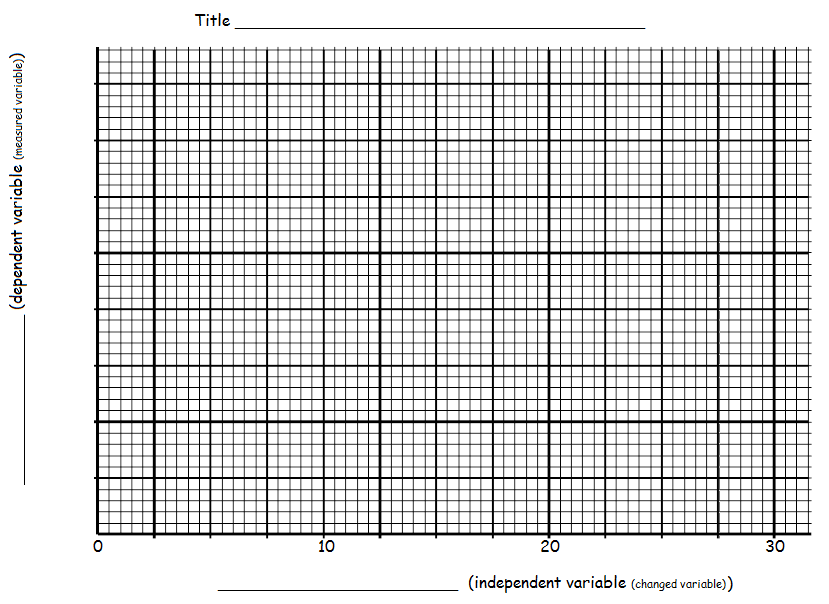
|  |  |
| --- | --- |
| 1. **Purpose of investigation** (this may be an aim, testable question, prediction or hypothesis) | |
| 2. **FAIR TEST**  Which variable will be changed? (This is the **independent** variable)  Which variable will have to be measured to get some data or information for the investigation? (This is the **dependent** variable) | |
| 1. Other variables that need to be controlled to make this a fair test. | |
| Other Variables | Describe how this variable will be controlled or kept the same? |
|  |  |
|  |  |
|  |  |

## Results:

**Recorded data:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. students | Time to complete passes (s) | | | |  | No. Students | Time to complete passes (s) | | | |
| 1 | 2 | 3 | ave |  | 1 | 2 | 3 | ave |
| 1 |  |  |  |  |  | 16 |  |  |  |  |
| 2 |  |  |  |  |  | 17 |  |  |  |  |
| 3 |  |  |  |  |  | 18 |  |  |  |  |
| 4 |  |  |  |  |  | 19 |  |  |  |  |
| 5 |  |  |  |  |  | 20 |  |  |  |  |
| 6 |  |  |  |  |  | 21 |  |  |  |  |
| 7 |  |  |  |  |  | 22 |  |  |  |  |
| 8 |  |  |  |  |  | 23 |  |  |  |  |
| 9 |  |  |  |  |  | 24 |  |  |  |  |
| 10 |  |  |  |  |  | 25 |  |  |  |  |
| 11 |  |  |  |  |  | 26 |  |  |  |  |
| 12 |  |  |  |  |  | 27 |  |  |  |  |
| 13 |  |  |  |  |  | 28 |  |  |  |  |
| 14 |  |  |  |  |  | 29 |  |  |  |  |
| 15 |  |  |  |  |  | 30 |  |  |  |  |

**Processed Data:** plot the points of the graph and then draw a line of best fit



**Interpretation of Data:**

*Gradient of line of best fit = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**From maths you know that a straight line graph has the equation y = mx + b. Where m is the gradient and b is the y-intercept. What is the equation for your line?**

**Prediction: Using your equation what do you predict the time to complete the ball pass if 43 people were in the line.**